

Analysis of the Evolution Process and the Control of Southern China Devonian Reef

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Abstract. In the modern archaeology study, Devonian in the South China is an important research course mainly on Devonian reefs in south China, taking the existing data of the Devonian reefs in south China and related research materials as the main materials of the study, complying map of reefs in different periods according to the type of Devonian reefs in the south China. It is found that the Devonian reefs in southern China distribution change gradually from southwest to north east, and become gradually new. The article focuses on the evolution of the south China Devonian reefs: to study characteristics of distribution based on the classification of reefs. And the article also studies the controlling factors of Devonian reefs in southern China to complete research materials of modern Devonian reefs in the south China so as to improve the effect of study.

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Introduction

At present, there are many researches on Southern China Devonian reefs, which are generally carried out based on the existing research data. Researches mainly focused on the research data of Southern China Devonian reefs and the data of reefs in other areas. (Devonian reef combination in Western Australia basin). To explore the evolution process of local reef by analyzing the form and evolution characteristics of Devonian reefs in Southern China. It is found that Southern China Devonian reef has three characteristics, there is little difference among the reefs in different layers, among which the shallow reef differs greatly and deep water reefs differ slightly which can be ignored as no change. Besides, time is an important factor which affects the reef change. Through the analysis of the quantity and distribution scale of reefs in different period can explore the control factor of its distribution. And by researching the Southern China Devonian period biological Reef, the research of the change of climate and environment in different period can be realized.

An overview of Organic reefs

Organic reef is an important carrier to study the relationship between organisms and environment. Through the research of the evolution process of the organic reef, researches can be made on the relationships between the current organisms and environment, organisms and climate, so as to realize the value of modern biological research. Although in modern biological research, the study of organic reef is an important issue that can not be ignored and there are more investigations on the organic reefs, scholars did not make explicit regulations on the definition and classification of the organic reefs in the actual study. The research and classification of organic reef is a complex problem. On the definition of the organic reef, different scholars have different

opinions. The paper mainly studies the definition and classification of organic reefs on the basis of other scholar's researches and attempts to put forward personal opinions.

There are more definitions of organic reefs, among which with high degree of recognition

Reason for Reefs classification	type	advantages
Reef-forming organisms	layer foram reef, coral reef, foam coral reef and bacteria algae microorganisms reef	further refine the classification of the reefs
Ancient Geographic position	fringing reef, reef, platform margin reef, slope, basin reef	To study the relationship between the distribution and geographical environment

includes Dunham's definition on organic reefs, Stanton's definition on carbonatite build-up and Wood's and Riding's definition on organic reefs, etc. Different definitions are on the different research focuses. This paper will put the research emphasis on the evolution, control analysis of reefs. According to the research focus, the article integrated the definitions of Wood and Kiessling, the organic reef is defined as: The bumps formed by organisms in its original place, the Carbonate geological body that differs from the sediment over the same period.

Organic reef classification in table 1

A. The Classification of the Reefs

Organic reef is a complex research topic. It not only contains the knowledge of biological knowledge, but also involves multidisciplinary content. For example, the research on the distribution of organic reef related to the professional knowledge of sedimentology and petrology. Organic reef belongs to the paleontology discipline, and also contains archaeological professional knowledge. Wood in 1999, Kiessling in 2002, and Chinese scholar Zhong Jianhua in 2005 pointed out that, in the study of biological reef, it is necessary not only to study the type and the chemical composition (carbonate components) of organisms, but also to analyze the internal structure of organic reef, etc..

First, we conduct the research on the classification of reefs. According to the practicality and universality of organic reef, the Southern China Devonian reef can be classified into the following two categories;

It can be seen in table 1, the classification of the Southern China Devonian reef is mainly according to the organisms of reef-forming layer and ancient geographic position. In the reef-forming layer, organic reefs can be divided into four categories such as layer foram reef, coral reef, etc. Through biological classification the study of reef-forming formation, reefs will be further divided into four types of reef combining with the structure characteristics of reef limestone (skeleton rock, barrier rock and bonding). The comparison between biological reef formation and non-reef facies strata can deepen understanding of the biological reef internal structure and evolution. According to the geographical location of reef, Southern China Devonian reef can be divided into five categories including fringing reef, reef, platform margin reef, slope and basin reef. Through this kind of classification, it is beneficial for us to explore the relationship between distribution of organic reefs and the ancient geographical environment and many other factors. The article mainly studies the second mode of division and the relationship between the four categories in the research of Devonian the reefs in the south China, exploring the evolution of reef assisted by the some content of the first category.

B. The Research Process of Southern China Devonian Reef

The research on Devonian reefs in the south China has a long history. At present, there are hundreds of related research papers. The study has certain research results. In 1980s our country put the research focus on organic reef in the research of Southern China Devonian reef, generally study for a class or a single organic reef, and supplement the data for the study of organic reef through a comparative study of different underlying reefs. In 1988, for example, *the reefs of China's geological period*, by biologists Zeng Dingqian clearly put forward the research object as the organic reefs, mainly research on the distribution of organic reefs in different geological period. Since then, the research on the organic reef has been increasing, which has greatly enriched the research data of modern biological reef.

The Evolution Process of Devonian Reefs in South China

The evolution of the Devonian reefs of the south China can be divided into four phases according to the historical period, as shown in table 2:

Historical period of organic reefs	name	Organic reef species	distribution area
Developmental period	Emsian Age to Eifelian Age	Bed plate coral reefs (small layer foram)	department of south China Hainan, Longlin, Guang nam, Funing Debao, north flow area, basically form the migration route from south to north
Outbreak period	Jewett period	on a layer of foram coral reef (a small amount of tabulate coral)	the south China sea from south to north, develop from the west to the east
Decay period	Late Jewett period to Frasnian period	a layer of foram coral reef (a small amount of bacteria, algae, and coral)	Almost extinct
Extensive development period	Famennian Age	bacteria and algae reef enrichment region	Guangxi, Guilin, Heng county, Six areas

Devonian reefs in southern China, as you can see from table 2, have undergone four evolution stages: Emsian Age to Eifelian Age--Jewett period--Late Jewett period to Frasnian period--Famennian Age. Categories of organic reefs is different during 4 periods, bed plate coral reef, on a layer of foram coral reef, a layer of foram coral reef and bacteria and algae reef. It is found that the distribution of the reefs are "from south to north and from west to east" in the first three stages of the Devonian reefs in the south China. That makes the increasing trend, and gives the distribution of organic reef formation formed from southwest to north east invasion. In the third phase -- the decay period, the development of reefs has bigger changes. Reefs near the south China sea (platform reef) almost recess. The organic reef near south China Sea almost extinct. The main reason is due to ancient geographical environment changes. Besides, the specific distribution of reefs also has certain regularity. It is found that the stability of the Devonian reefs in southern China gradually increases. The distribution difference of shallow

reef (fringing reef and platform reef) is maximal. The second one is the change of platform margin reef. The change of deep reef (reef, basin slope) is the smallest, almost unchanged. According to the stability of the reefs, we can see that the change of the geographical environment of shallow reef area is maximal. That of the largest deep-water reef area of geographical environment is minimal.

Control Analysis of Southern China Devonian Reef

Control factors of the Devonian reefs of the south China is researched mainly from the geographical environment, climate and so on. South China plate is rich area of the organic reefs. There are various organic reef types in this area. From biological reef distribution, we can do research on the the relationship between the geographical environment and climate. It must be clear that the position of South China plate. It belongs to the tropical, subtropical, plate near the equator. The complicated geographical structure leads to "global" and "local" in the distribution of Southern China Devonian reef. The control factors can be studied from the above two aspects. Local factors is more complex, and factors change quickly. In a short period of time, it is difficult to study effectively, so the article explore the "global" controlling factors . It is found that climate (temperature), vegetation ecosystem and geographical environment (represented by climate and vegetation distribution) are the main controlling factors.

A. Climate

One of the control factors of Devonian reefs is the climate in which the temperature directly affect the distribution of reefs. In recent years, as global temperature rises, south of the Devonian reefs of the south China appear bleaching phenomenon. The change of reefs can effectively reflect the change of environment. Therefore, in the combination of modern biological reef study, it can be seen as the ancient geographical climate change. From this we can see that the geographical climate has a close relationship with the development and the distribution of the organic reef. Different reefs match with different temperatures. For example, the best temperature of a layer of foram coral reef in Southern China is the same as that of modern coral reefs, remaining at about 23 to 28 degrees.

B. Vegetation

In the ecosystem, one of the important part is the forest vegetation. The vegetation use the ancient geographical environment in the meantime it has an effect on the geographical environment. That is to say, the forest vegetation can produce slow transformation of geographic ecological environment. Organic reef, as "a member" in the ecosystem, is also indirectly affected by the forest vegetation. The effect is as follows: the effect of forest vegetation on atmospheric climate, the further effect on the living climate of the organic reefs. In addition, the forest vegetation can influence organic weathering and lead soil nutrients into the sea, providing nutrients for the development of reefs and so on.

Conclusion

The evolution of the Devonian reefs in southern China has four stages, and the main types of the reefs in each stage are different, neither are its distribution areas. On the whole, Devonian reefs in southern China present the migration trend from southwest to north east. In the distribution of the reefs, the main control factors are climate, vegetation, and geographical environment. Through analysis of the specific control influence factors can effectively explore the biological reef

distribution of south China plate and enrich modern biological reef research materials.

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